Projekt: STRATEGIJA PRILAGODBE KLIMATSKIM PROMJENAMA

Globalni i regionalni utjecaj klimatskih promjena na slatkovodnu i higrofilnu faunu

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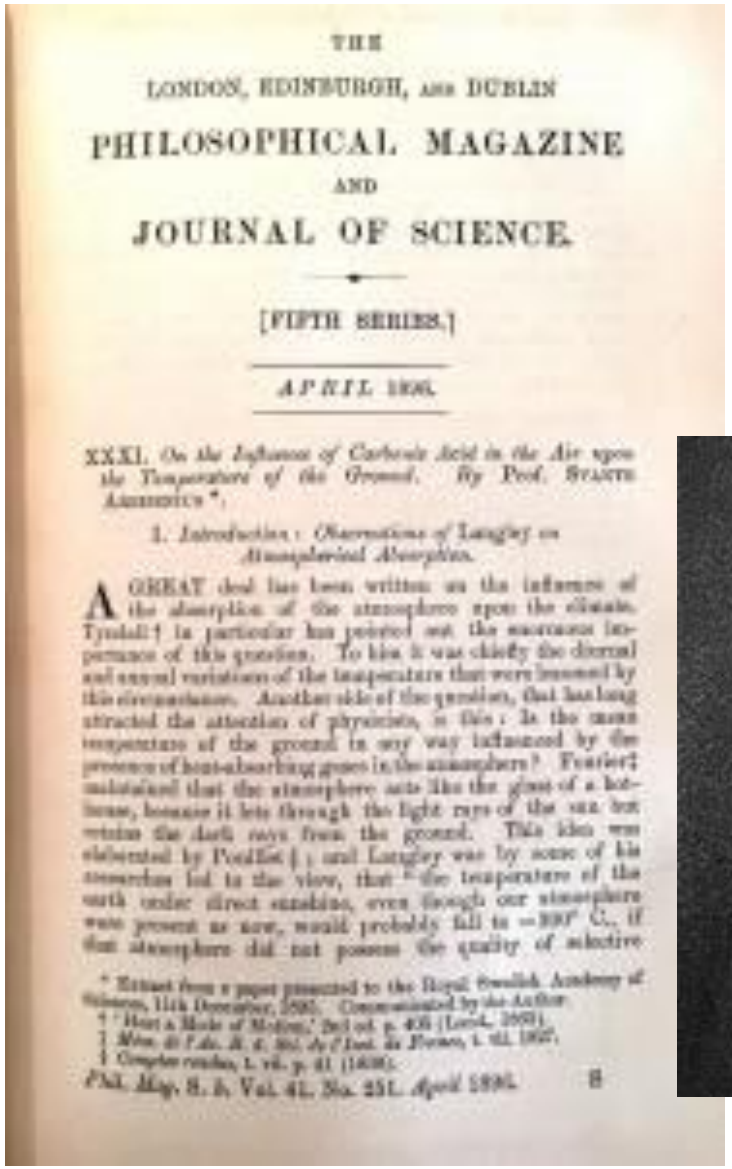
HIB
Croatian Institute for Biodiversity



THE

LONDON, EDINBURGH, AND DUBLIN

PHILOSOPHICAL MAGAZINE

AND

JOURNAL OF SCIENCE.

[FIFTH SERIES.]

APRIL 1896.

XXXI. *On the Influence of Carbonic Acid in the Air upon the Temperature of the Ground.* By Prof. SVANTE ARRHENIUS *.

1. *Introduction: Observations of Langley on Atmospherical Absorption.*

A GREAT deal has been written on the influence of the absorption of the atmosphere upon the climate. Tyndall † in particular has pointed out the enormous importance of this question. To him it was chiefly the diurnal and annual variations of the temperature that were lessened by this circumstance. Another side of the question, that has long attracted the attention of physicists, is this: Is the mean temperature of the ground in any way influenced by the presence of heat-absorbing gases in the atmosphere? Fourier‡ maintained that the atmosphere acts like the glass of a hot-house, because it lets through the light rays of the sun but retains the dark rays from the ground. This idea was elaborated by Pouillet §; and Langley was by some of his researches led to the view, that "the temperature of the earth under direct sunshine, even though our atmosphere were present as now, would probably fall to −200° C., if that atmosphere did not possess the quality of selective

* Extract from a paper presented to the Royal Swedish Academy of Sciences, 11th December, 1895. Communicated by the Author.

† 'Heat a Mode of Motion,' 2nd ed. p. 406 (London, 1863).

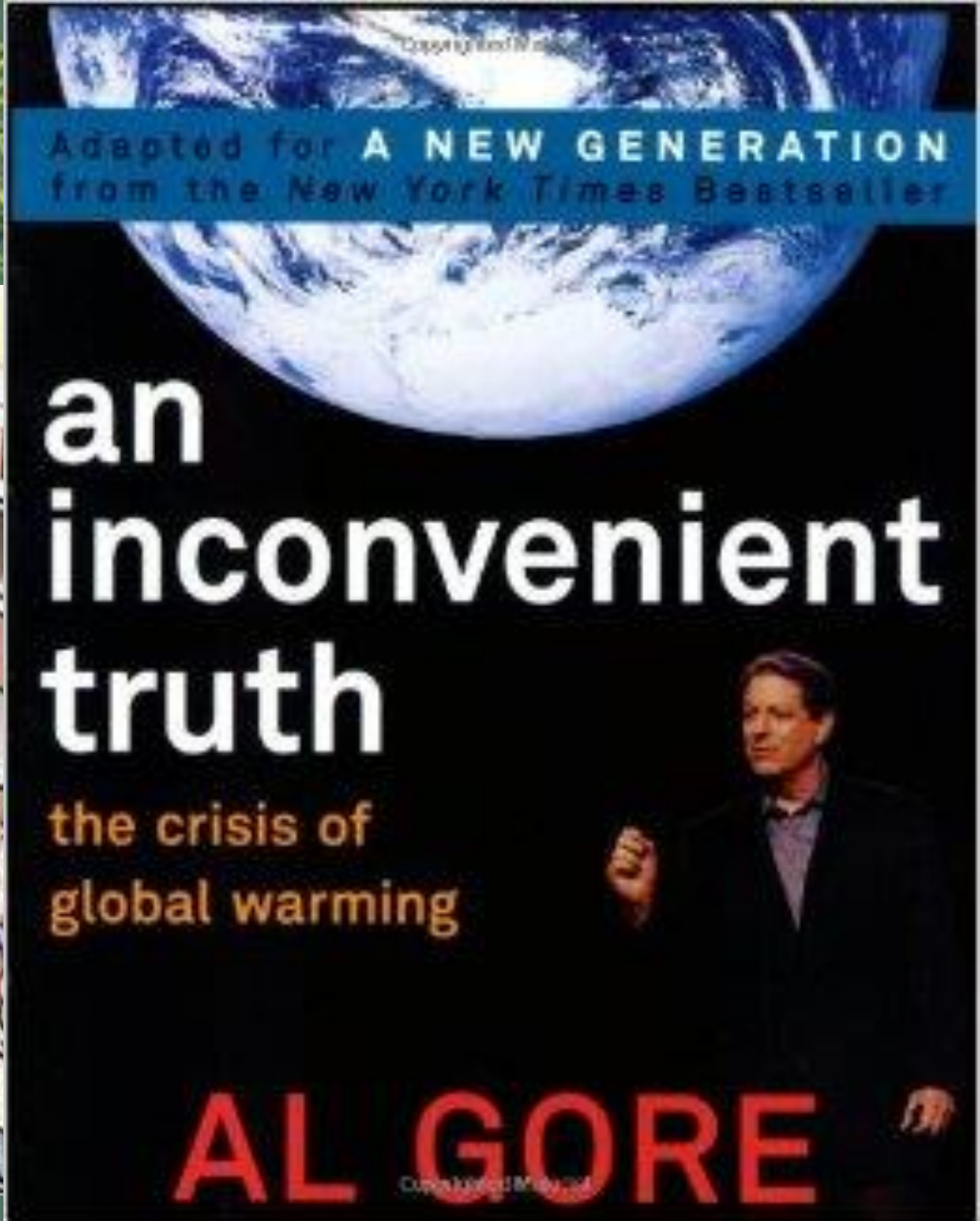
‡ *Mém. de l'Ac. R. d. Sci. de l'Inst. de France*, t. vii. 1827.

§ *Comptes rendus*, t. vii. p. 41 (1838).

Svante Arrhenius,

Philosophical Magazine, 1896.

AN INCONVENIENT TRUT

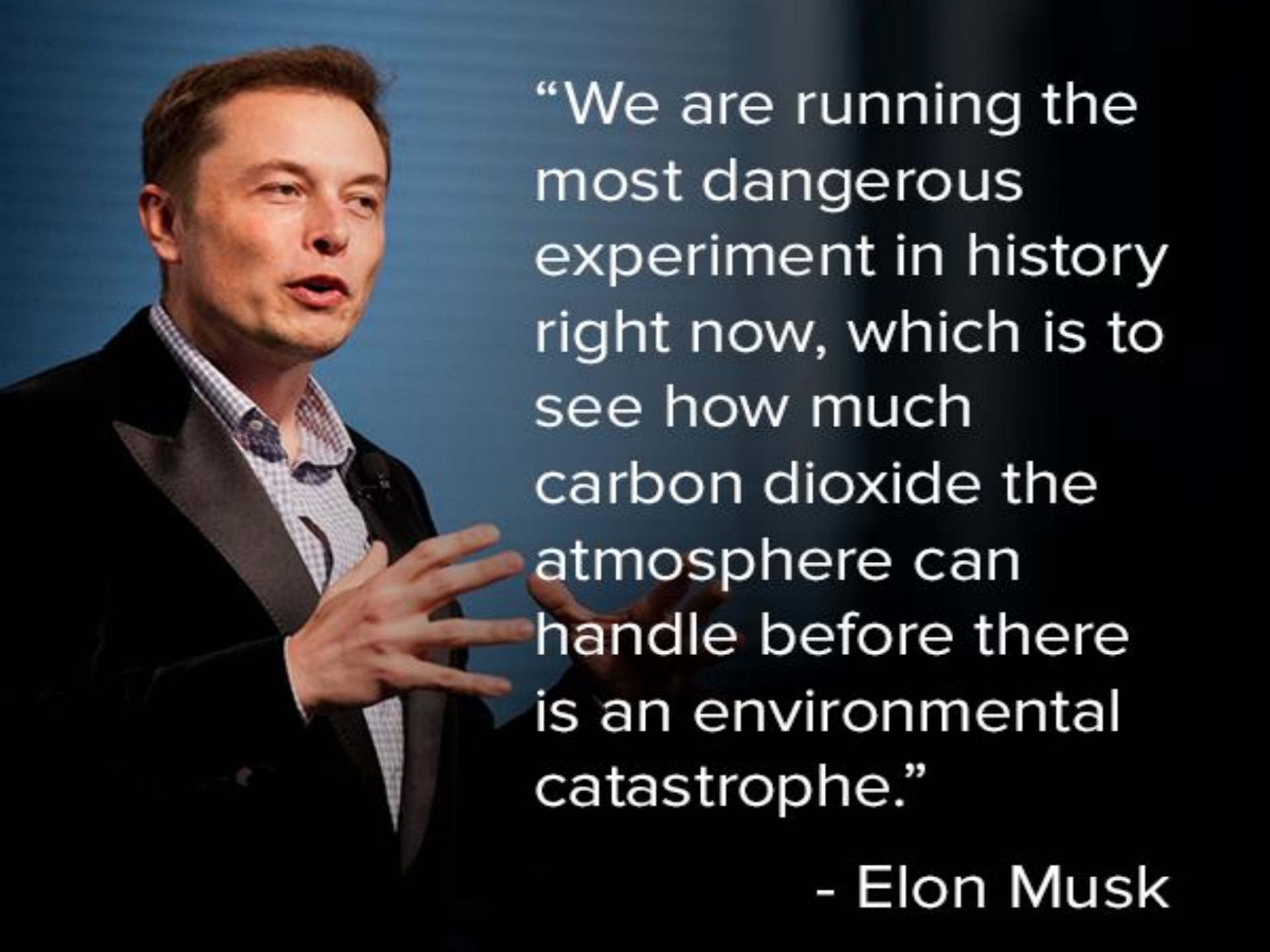

Adapted for A NEW GENERATION
from the New York Times Bestseller
an inconvenient truth
the crisis of global warming
AL GORE

„There is no more neutrality in the world. You either have to be part of the solution, or you're going to be part of the problem.”

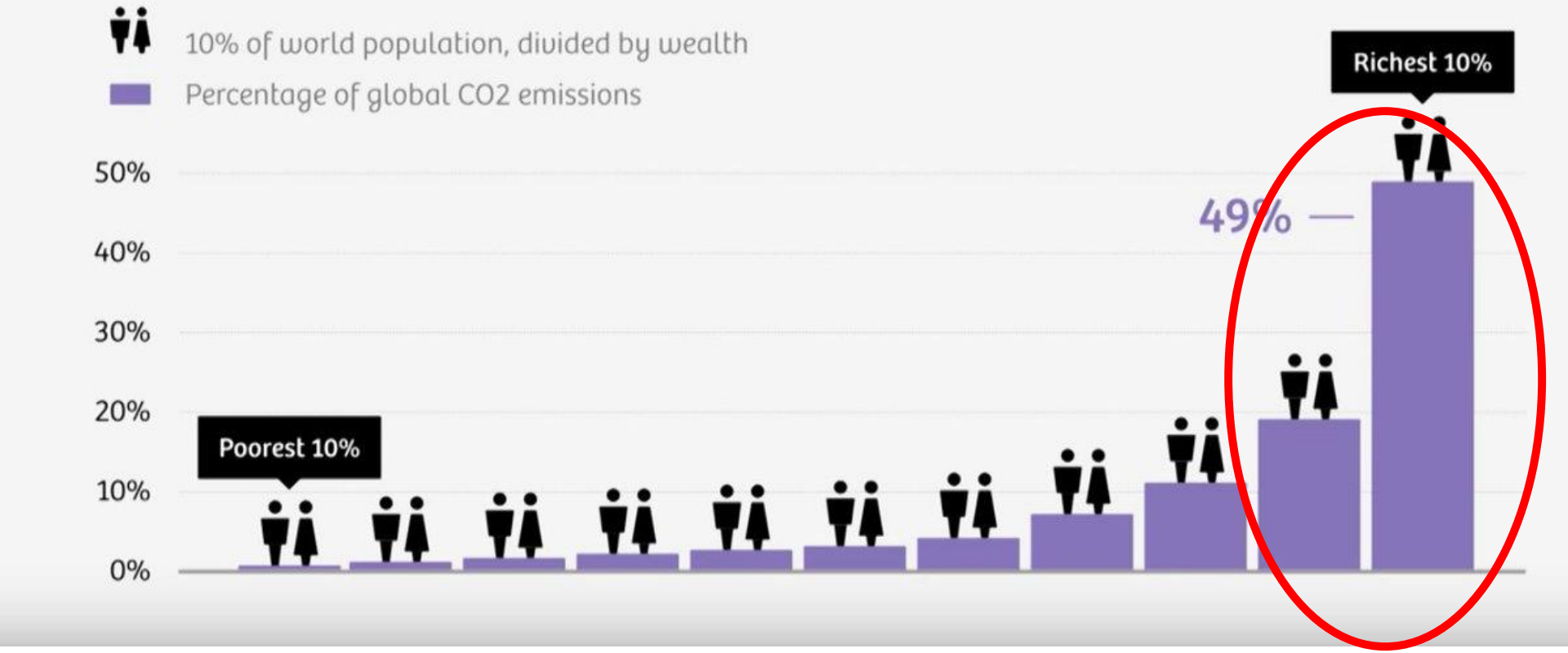
Eldridge Cleaver

„After the final no there comes a yes and on that yes the future of the world hangs.”

Wallace Stevens


“We are running the most dangerous experiment in history right now, which is to see how much carbon dioxide the atmosphere can handle before there is an environmental catastrophe.”
- Elon Musk

The top 10% of consumers emit half of the worlds carbon



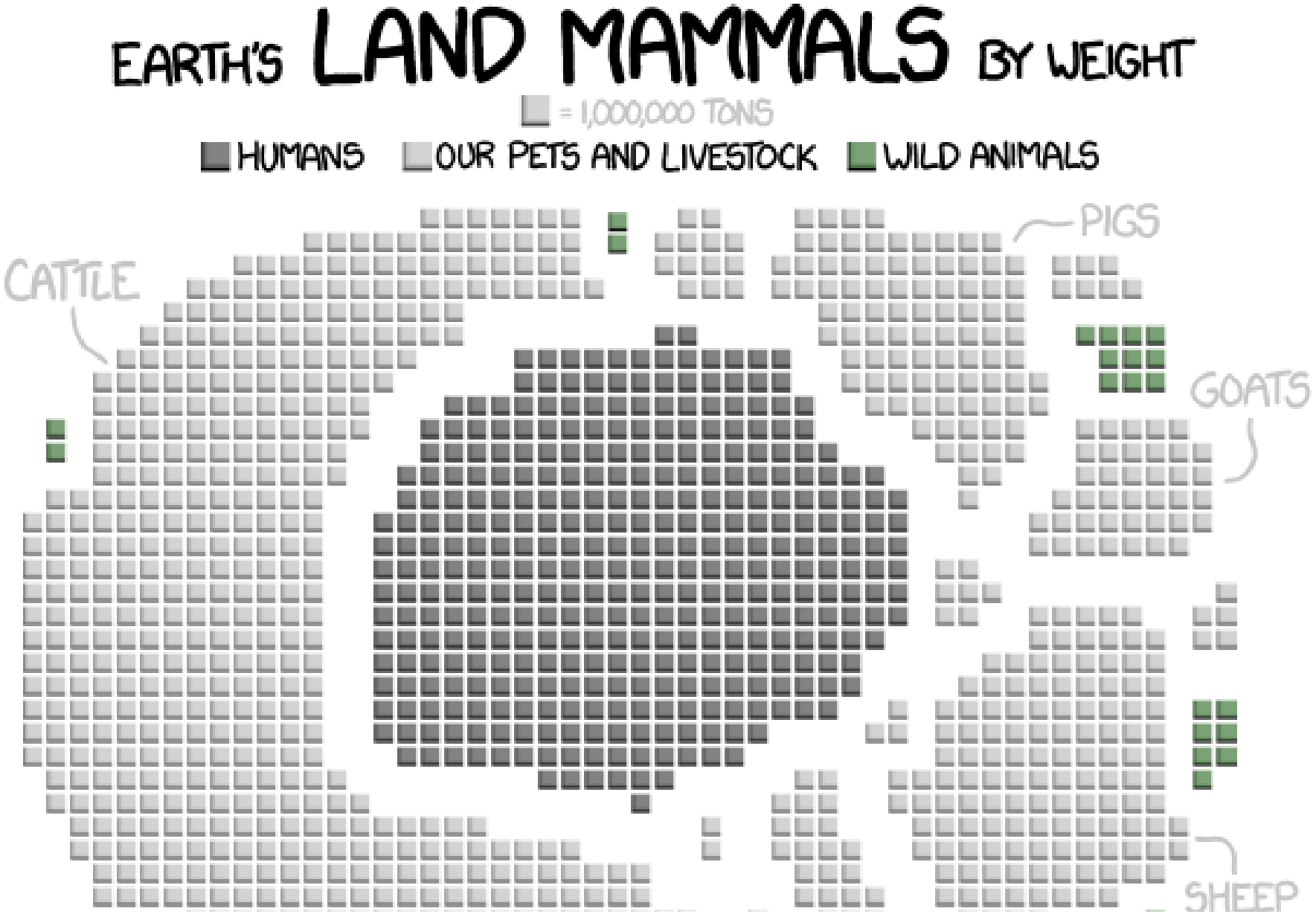


Image credit: [xkcd]

A gdje je tu Hrvatska?

„Many of the climate change adaptation models hugely overestimate how quickly other countries arround the world can start to reduce the emissions.”

Alice Bows-Larkin

EEA Member countries	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Austria											
Belgium											
Bulgaria											
Croatia											
Cyprus											
Czech Republic											
Denmark											
Estonia											
Finland											
France											
Germany											
Greece											
Hungary											
Ireland											
Italy											
Latvia											
Lithuania											
Luxembourg											
Malta											
Netherlands											
Poland											
Portugal											
Romania											
Slovakia											
Slovenia											
Spain											
Sweden											
United Kingdom											
Iceland											
Liechtenstein											
Norway *											
Switzerland											
Turkey											

2017.

* Norway had a NAP before a NAS

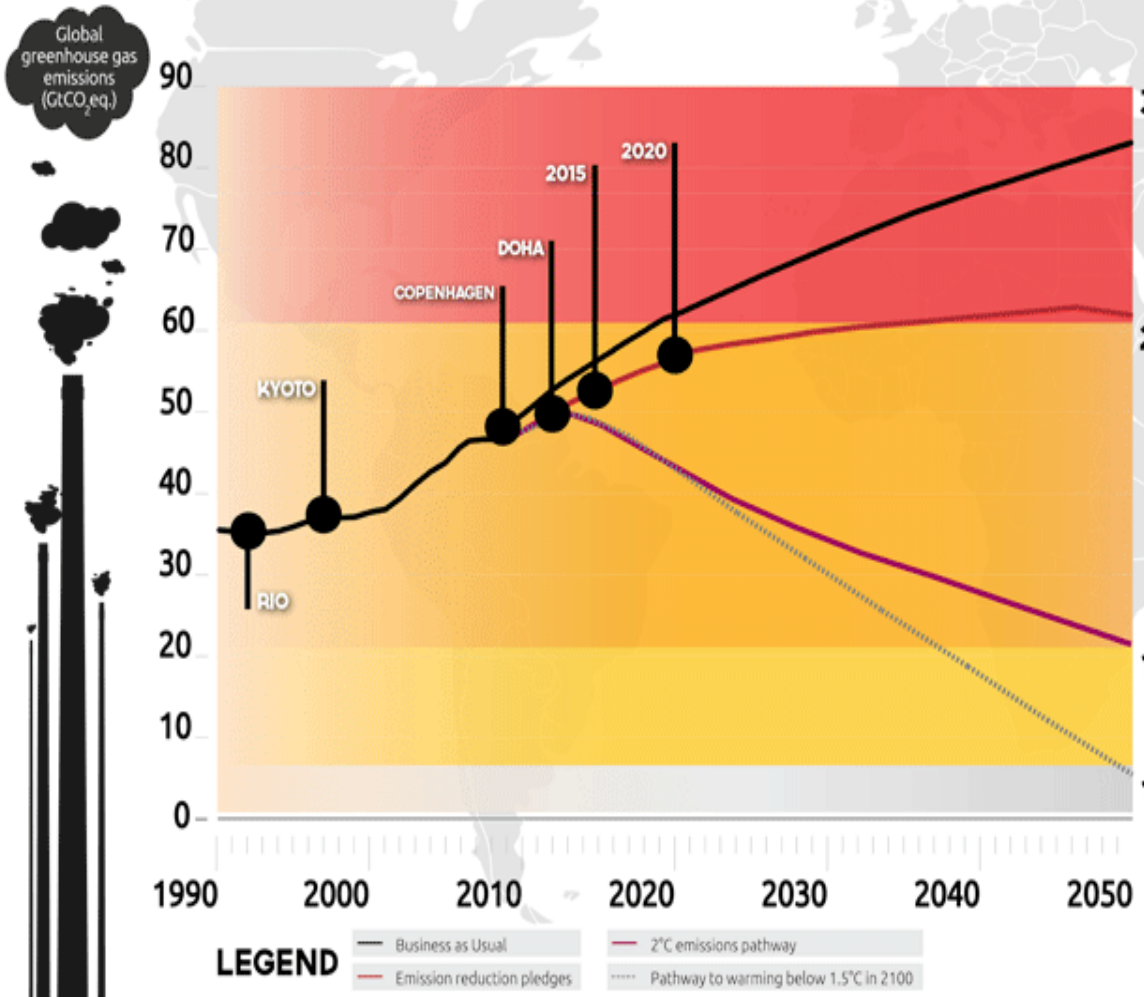
National adaptation strategy (NAS) in place

National adaptation strategy (NAS) and national and/or sectoral adaptation plans (NAP/SAP) in place

No policy

STAYING BELOW 2°C: THE CHOICES WE FACE

With current pledges on the table to cut emissions, we are heading to a 3.3° C warming future. No further action before 2020 will limit society's choices.
As temperatures rise, so do the impacts.



Adaptation highly questionable

Unprecedented heat waves

20-30% increase extreme precipitation

Risk of global mass extinctions

Global crop decline

Significant Amazon dieback

Millions risk displacement by sea level rise

Tipping point for Greenland Ice Sheet

High risks for regional food security

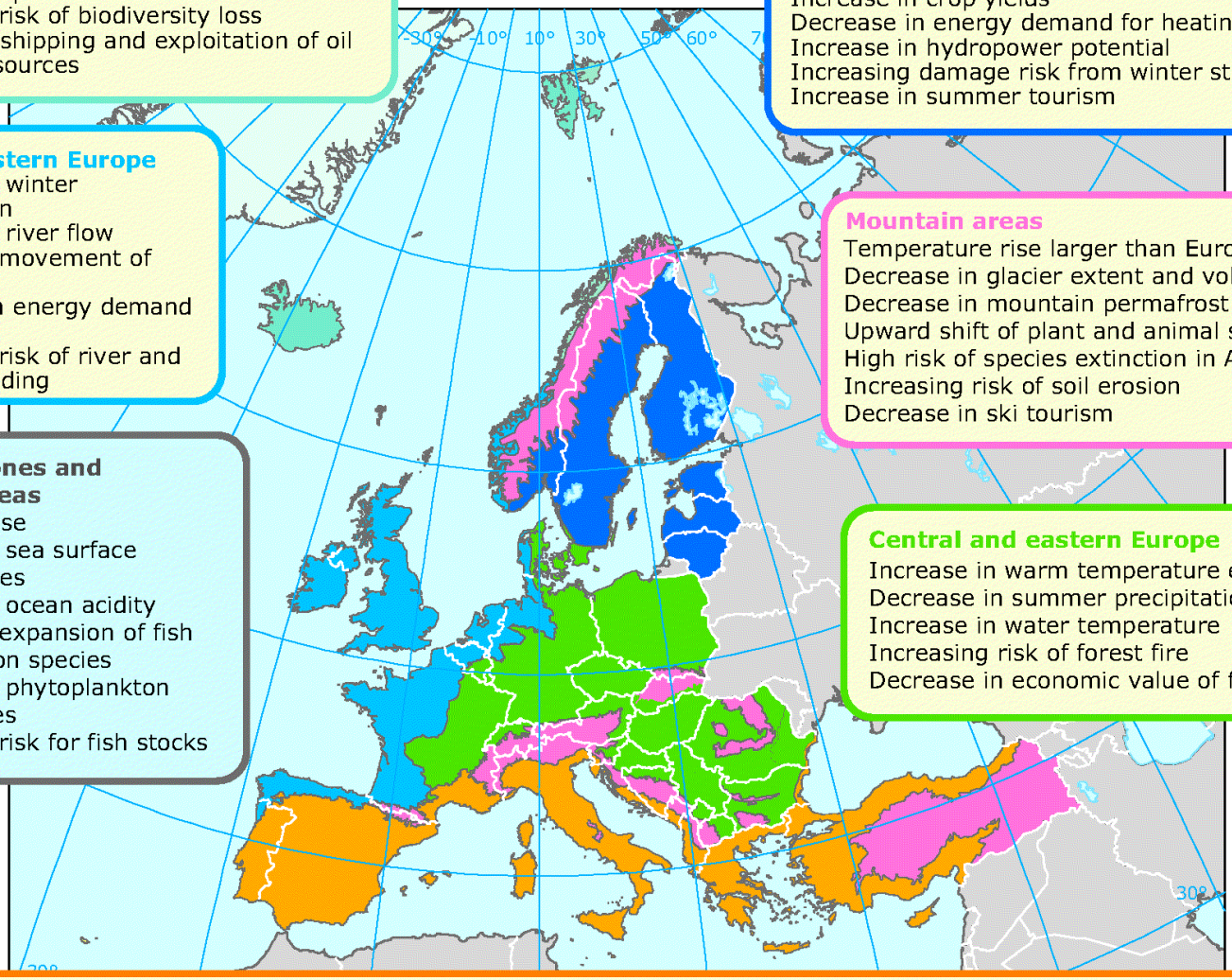
Major risk to most coral reefs

Food production losses

Extreme heat waves with severe societal impacts

©www.climateactiontracker.org
Ecofys | Climate Analytics | PIK

EEA, 2012



Arctic
Temperature rise much larger than global average
Decrease in Arctic sea ice coverage
Decrease in Greenland ice sheet
Decrease in permafrost areas
Increasing risk of biodiversity loss
Intensified shipping and exploitation of oil and gas resources

Northern Europe
Temperature rise much larger than global average
Decrease in snow, lake and river ice cover
Increase in river flows
Northward movement of species
Increase in crop yields
Decrease in energy demand for heating
Increase in hydropower potential
Increasing damage risk from winter storms
Increase in summer tourism

North-western Europe
Increase in winter precipitation
Increase in river flow
Northward movement of species
Decrease in energy demand for heating
Increasing risk of river and coastal flooding

Mountain areas
Temperature rise larger than European average
Decrease in glacier extent and volume
Decrease in mountain permafrost areas
Upward shift of plant and animal species
High risk of species extinction in Alpine regions
Increasing risk of soil erosion
Decrease in ski tourism

Coastal zones and regional seas
Sea-level rise
Increase in sea surface temperatures
Increase in ocean acidity
Northward expansion of fish and plankton species
Changes in phytoplankton communities
Increasing risk for fish stocks

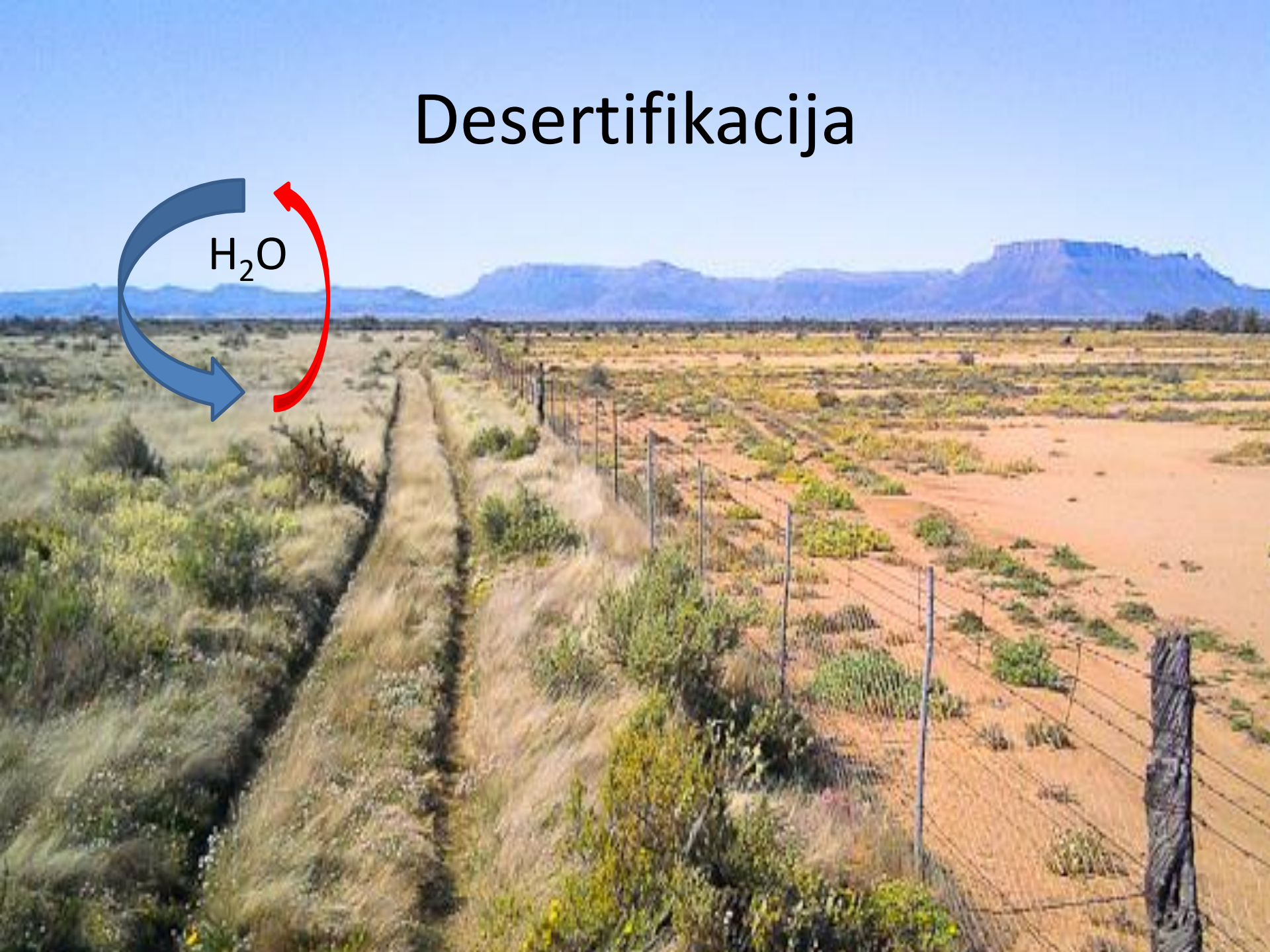
Central and eastern Europe
Increase in warm temperature extremes
Decrease in summer precipitation
Increase in water temperature
Increasing risk of forest fire
Decrease in economic value of forests

Mediterranean region
Temperature rise larger than European average
Decrease in annual precipitation
Decrease in annual river flow
Increasing risk of biodiversity loss
Increasing risk of desertification
Increasing water demand for agriculture
Decrease in crop yields
Increasing risk of forest fire
Increase in mortality from heat waves
Expansion of habitats for southern disease vectors
Decrease in hydropower potential
Decrease in summer tourism and potential increase in other seasons

Predviđeni utjecaji

- Smanjivanje količine padalina (desertifikacija)
- Smanjena dostupnost vode i doprinosa poljoprivrednih proizvoda
- Smanjeni protok riječnih tokova
- Povećanje prosječnih i ekstremnih temperatura
- Povećan rizik od dugotrajnih suša i gubitka bioraznolikosti
- Povećan rizik od požara (1ha = 6000 automobila/g)
- Smanjena dostupnost vode utjecat će na hidroenergetski sustav uz kontinuirani porast potrebe za energijom

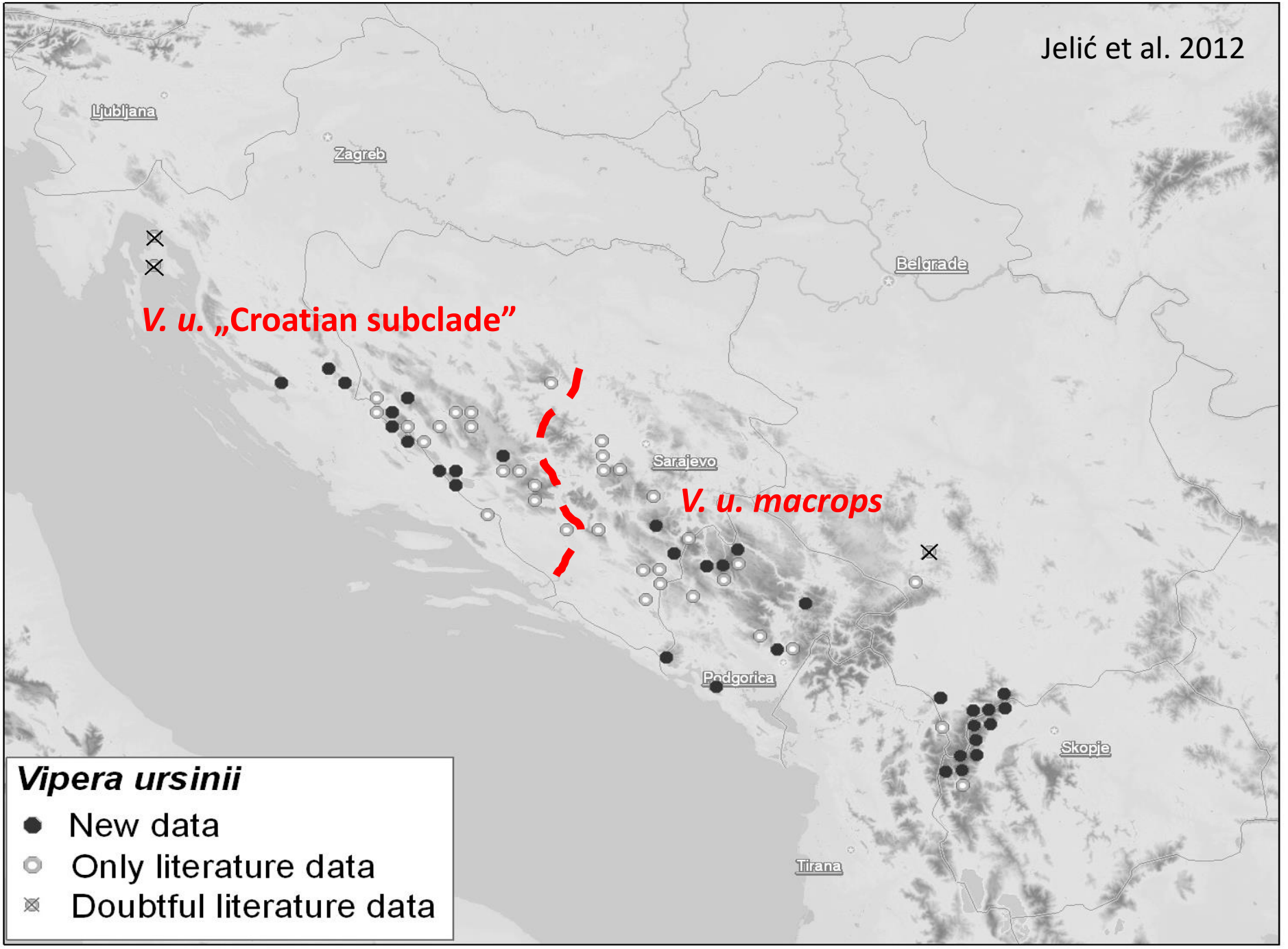
Desertifikacija



Sukcesija staništa

- Prirodni proces?
- Depopulacija ruralnih područja (Lika, Gorski kotar, unutrašnjost Dalmacije, Kordun, Banija, Slavonija…)

Vipera ursinii macrops „Croatia” subclade


Jelić et al. 2012
Ljubljana
Zagreb
Belgrade
V. u. „Croatian subclade”
Sarajevo
V. u. macrops
Podgorica
Skopje
Tirana
Vipera ursinii
New data
Only literature data
Doubtful literature data


Salamandra atra

Phoxinellus dalmaticus
Telestes tursky

Delminichthys krbavensis
Telestes fontinalis

Delminichthys jadovensis
Telestes croaticus

Telestes metohiensis

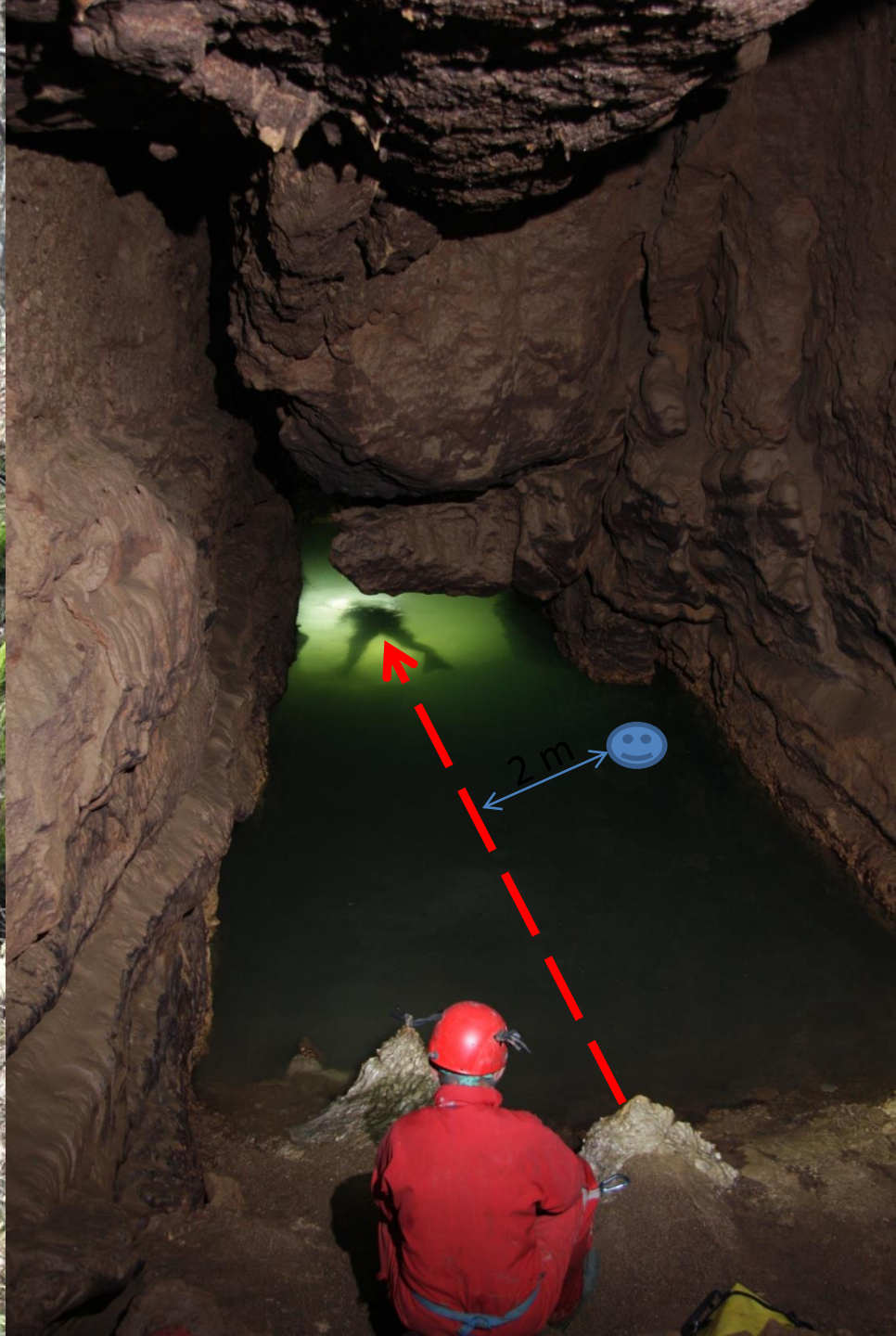
Salmo visovacensis

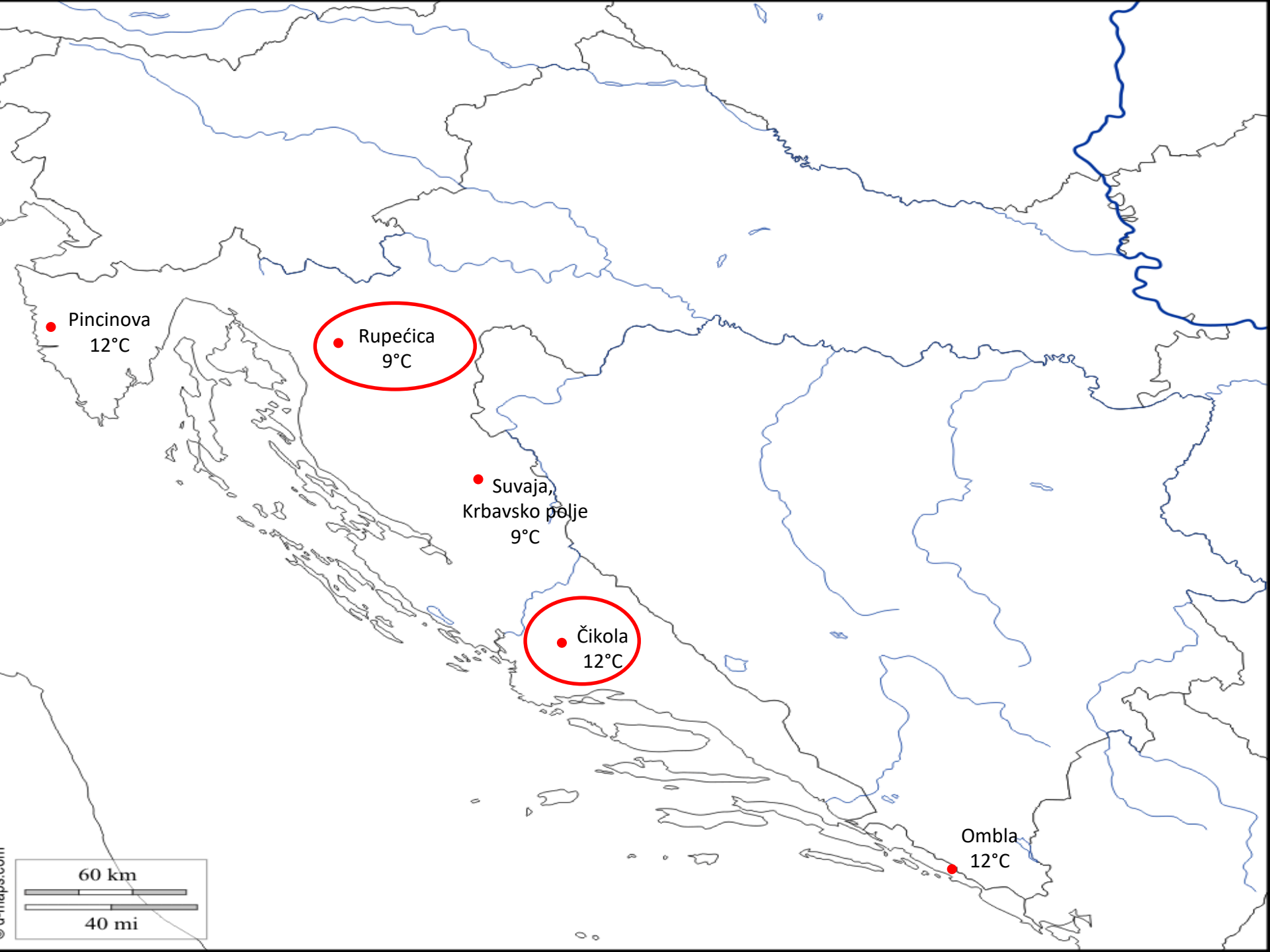
Romanogobio benacensis


HOBO
onset
Water Level Logger
range: 0 to 4 m (0 to 13 ft)
P/N: U20-001-04 S/N: 9738917
www.onsetcomp.com
onset
HOBO Dissolved Oxygen Logger
P/N: U26-001
S/N: XXXXXXXX
Onset Patent No. US 6,826,664
www.onsetcomp.com
Assembled in USA

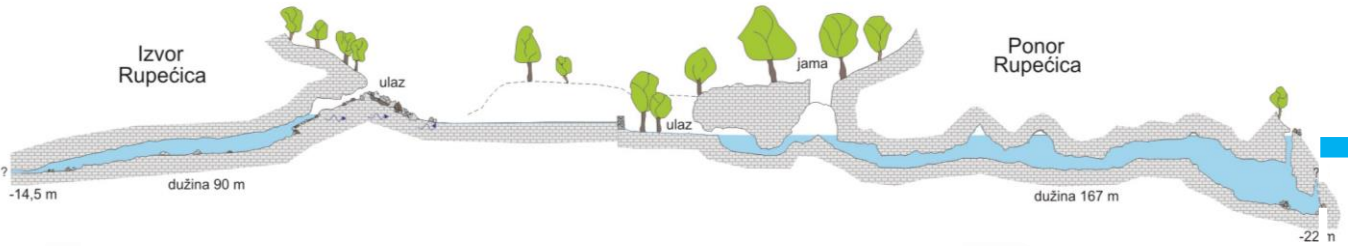
Cave diving

- Cold water (6 - 14° C)
- Low visibility
- Limited time
- Limited communication
- Heavy and expensive equipement
- Extremely dangerous


2 m

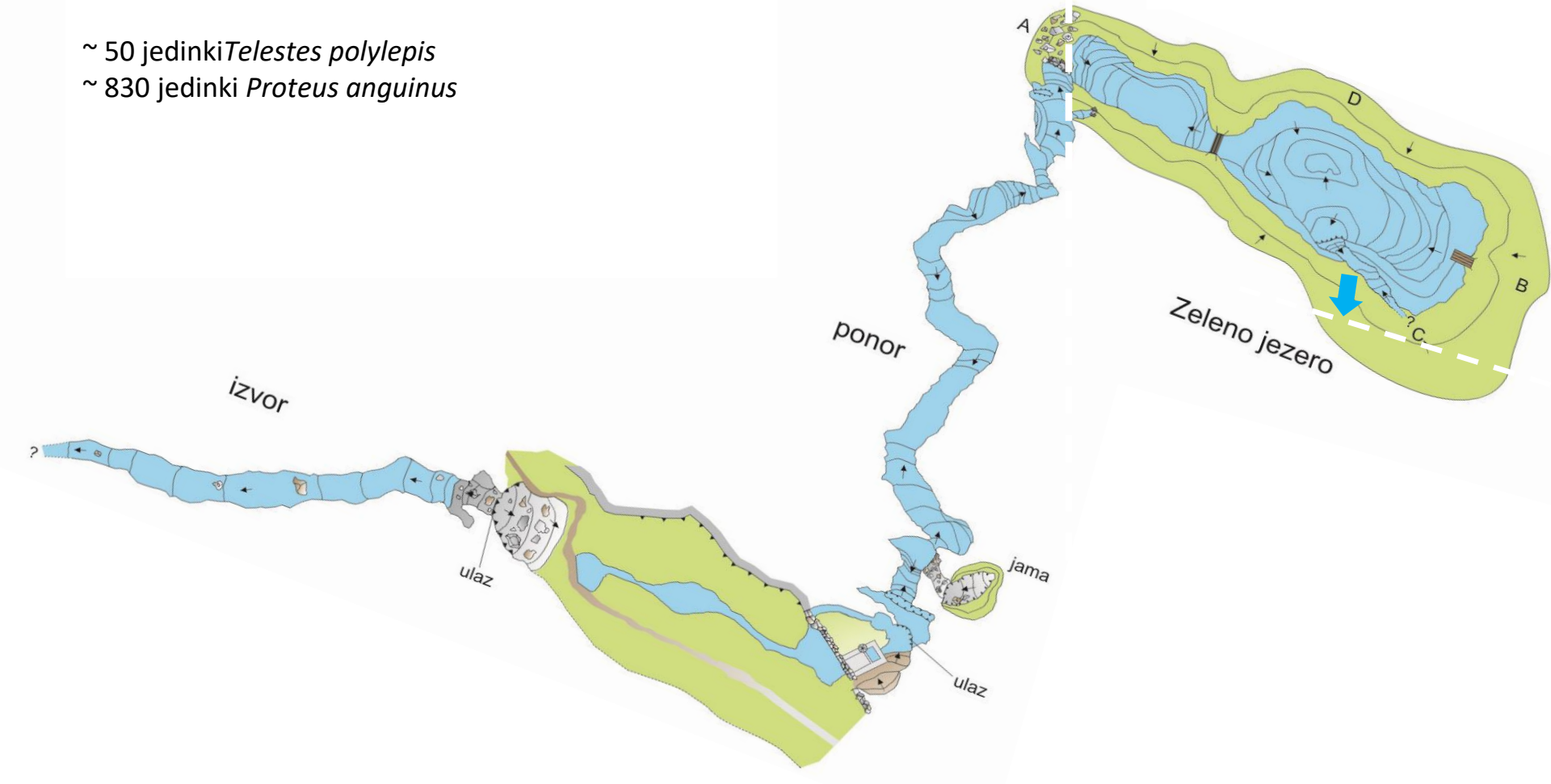

Pincinova
12°C
Rupećica
9°C
Suvaja,
Krbavsko polje
9°C
Čikola
12°C
Ombla
12°C
60 km
40 mi

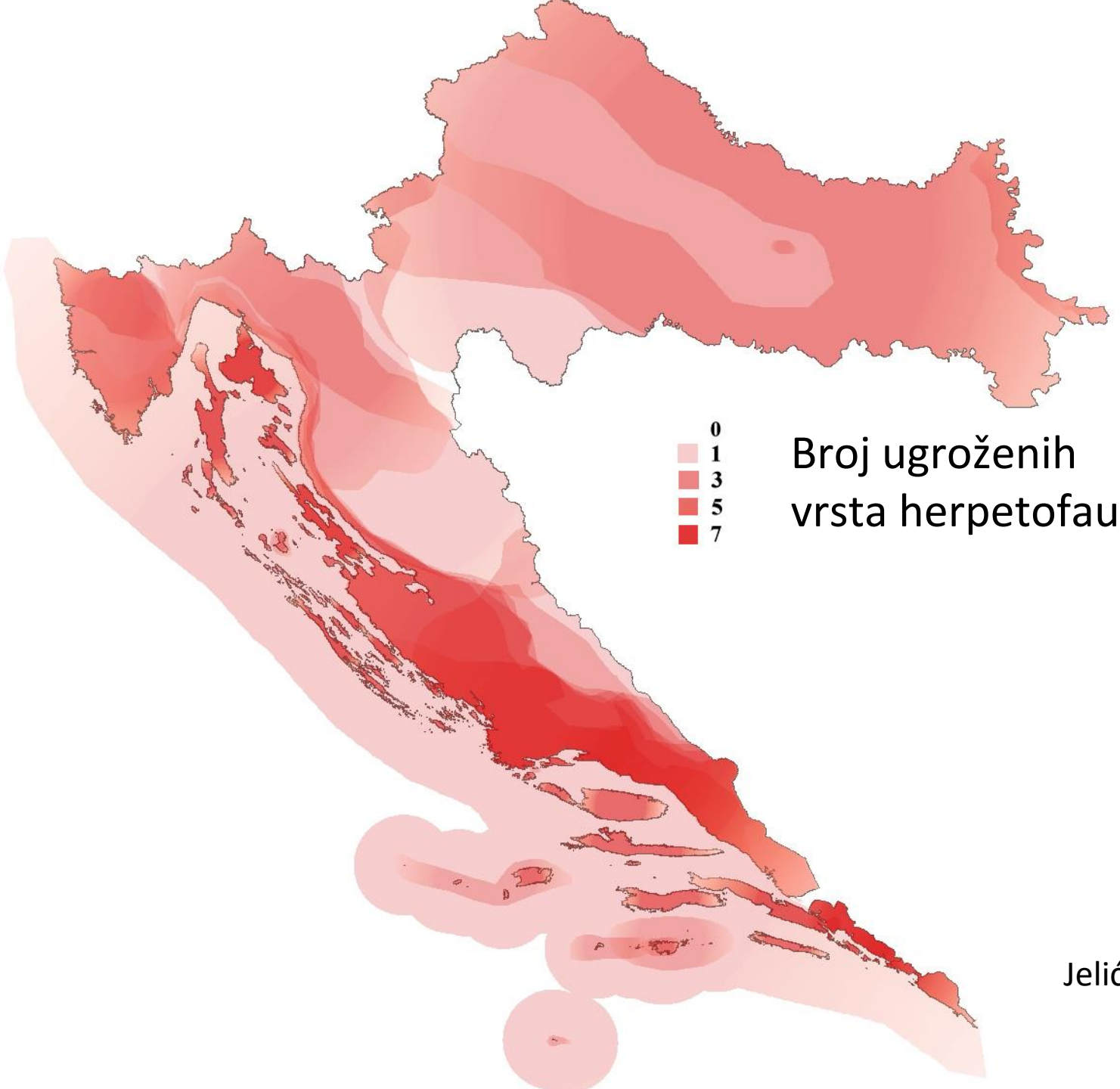
RUPEĆICA-ZELENO JEZERO (Šmitovo)



JEZERO
~ 40.000 *Phoxinus phoxinus*
~ 5000 *Squalius cephalus*
~ 100 *Tinca tinca*
- *Salmo trutta/labrax*

~ 50 jedinki*Telestes polylepis*
~ 830 jedinki *Proteus anguinus*





Broj ugroženih vrsta herpetofaune

Jelić i sur. 2012

Jelić & Hietala, 2015

SENSitivity INdex = SENSIN

- IUCN procijene rizika od izumiranja samo odražavaju trenutni rizik (kada je vrsta već gotovo izumrla)

- Teorija da mnoge vrste imaju ekološke karakteristike zbog kojih su podložnije riziku od izumiranja

Sensitivity index (Indeks osjetljivosti)

(1.) Illegal trade (IT), Value 0 - 3

(2.) Maximal body size (BS), Value 0 - 3

(3.) Distribution breadth (DB) in study area,

(4.) Frequency of reproduction (FR),

(5.) Litter size (LS),

(6.) Dietary breadth (FB),

(7.) Habitat breadth (HB): based on biogeographic regions (Continental, Pannonian, Mediterranean, Alpine),

(8.) Habits (HT),

(9.) Maximum age (MA),

(10.) Adaptability to altered habitats (AH).

(11.) IUCN global and regional status

< 1 - species is in no risk of decline,
1–1.7 - species is vulnerable to decline,
> 1.7 - species is seriously exposed to decline or even extinction

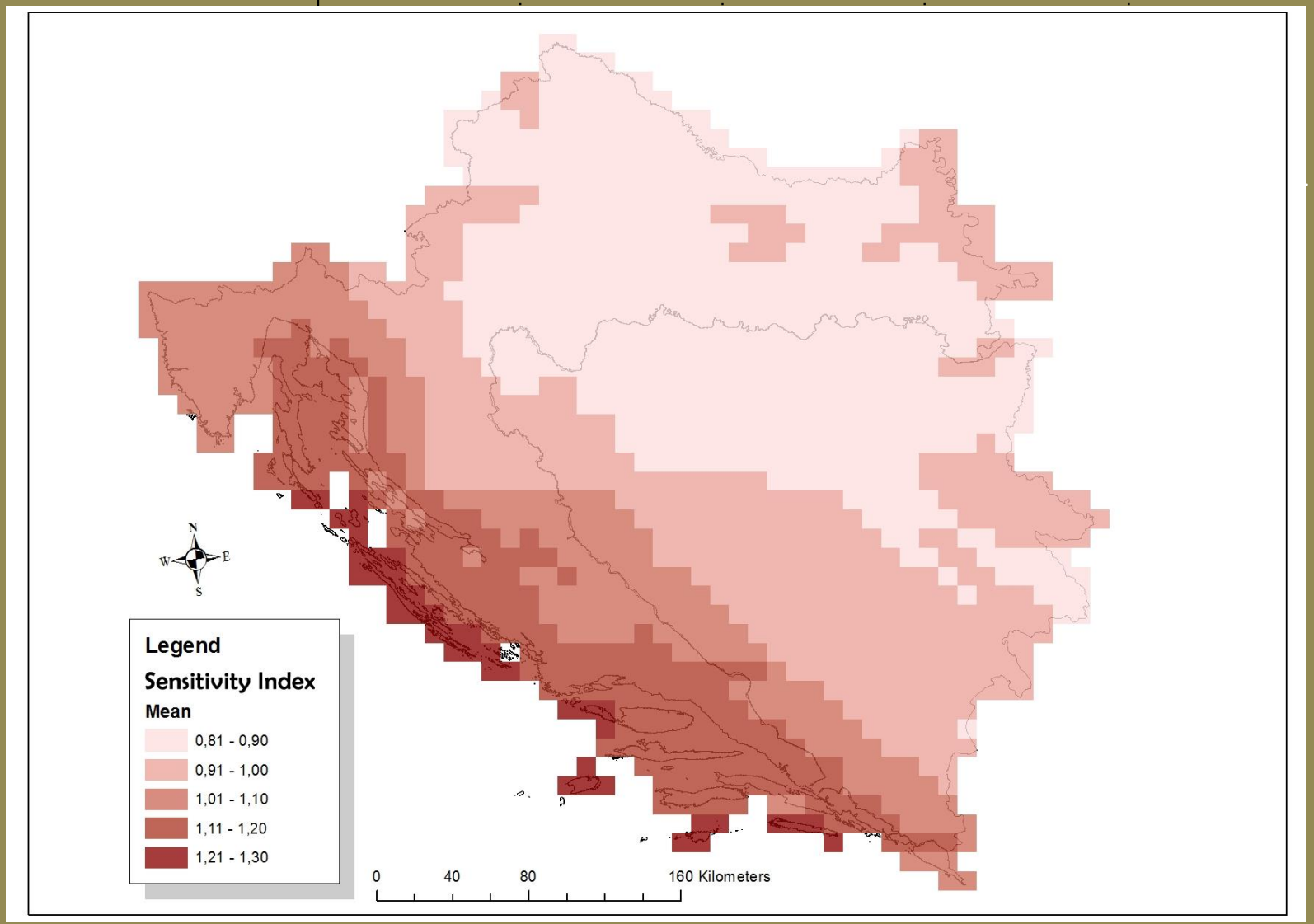
Variables [a]	Abbreviation	Categorization of vulnerability [b]			
		0	1	2	3
IUCN global status [c]	IWS	NE, LC or Alien	DD or NT	VU	EN or CR
Distribution breadth	DB	Non native or present in >51% of study area	Present in 11-50% of study area	Present in 6-10% of study area	Present in <5% of study area
Habitat breadth	HB	All 4 regions	3 regions	2 regions	Only 1 region
Area fragmentation	AF	<20%	21-50%	51-75%	76-100%
Home range	HR	<5 km²	6-50 km²	51-1000 km²	>1001 km²
Habits	H	Strictly nocturnal	Predominantly nocturnal	Diurnal and nocturnal	Diurnal
Body size	BS	3-30 cm	31-80 cm	81-250 cm	>251 cm
Sexual maturity	SM	First year or less	Second year	Between 3 and 4 years	More than 4 years
Births per year	B/Y	3-4 births/year or more	2 births/year	1 birth/year	Birth interval of more than 1 year
Offspring number	ON	>10 young	5-9 young	2-4 young	1 young
Dietary breadth	DiB	Opportunistic	Omnivorous	Specialized (Carnivorous, Herbivorous, Insectivorous)	Specialized on 1 species or group
Longevity	L	>20 years	10-19 years	3-9 years	1-2 years or less
Hunting	Hu	Not hunted	Poisoned species [b]	Scarcely hunted species	Hunted species
Elevation distribution	ED	Ubiquitous	Present between 500 to 1000 m	Present only at high altitudes (>1000 m)	Restricted to planes (<500 m)
Adaptability to altered habitats	AH	Extremely adaptable (found even in suburban centers)	Adaptable (found also in suburbia if small fields are available)	Scarcely adaptable (found at best in average sized natural woodlands)	Unadaptable (found only in large areas of well preserved natural habitats)
Taxonomic uniqueness	TU	Species of genus with more than 50 recognized species	Species of a genus with 20-49 recognized species	Species of a genus with 2-19 recognized species	Only species in the genus

[a] Description: **DB**: Geographical area occupied by the species in the study area; **HB**: Based on occurrence in four biogeographic regions of Croatia and Bosnia and Herzegovina (Continental, Pannonian, Mediterranean and Alpine); **AF**: Fragmentation and isolation affect population survivorship and diversity, the more habitat (original species distribution area) is fragmented, the more populations are isolated and subject to local extinctions; **HR**: Species with large home ranges are more vulnerable to habitat loss and degradation; **H**: Diurnal activity patterns enhance species' vulnerability; **BS**: adult body size; **SM**: Year of first births; **B/Y**: Number of births in the span of a year; **ON**: Number of offspring by female by birth; **DiB**: Adult diet. **L**: Lifespan recorded; **Hu**: Hunted or not hunted species. [b] Species considered as pests or unwanted that are occasionally poisoned; **ED**: Species living at low altitudes are more subject to anthropogenic disturbance; **AH**: Based on experts' input; **TU**: Gives more importance to species from a conservation point of view.

[b] The categories extend from low risk '0' to high risk '3'

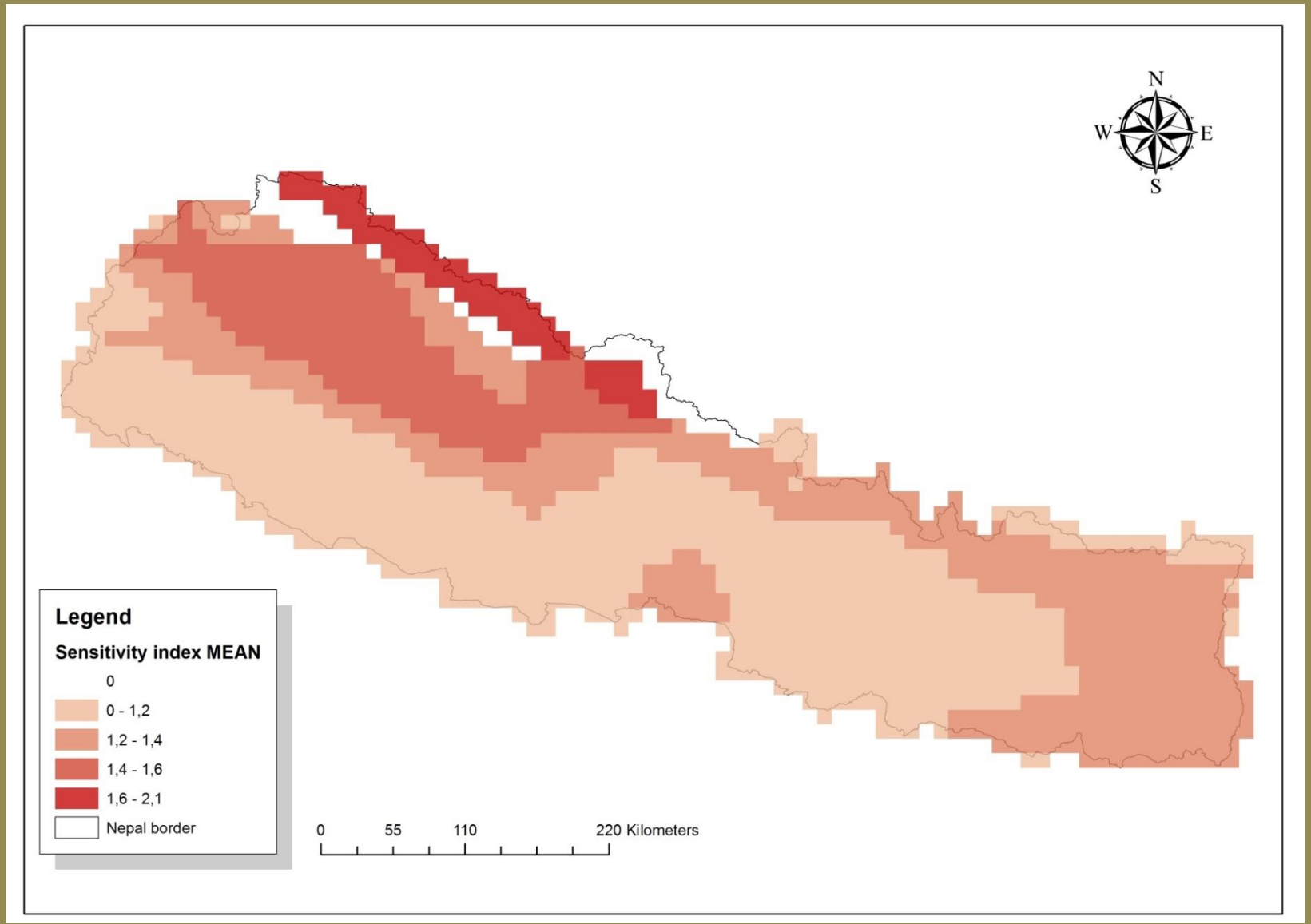
[c] Abbreviations: NE: Not Evaluated; LC: Least Concern; DD; Data Deficient; NT: Near Threatened; VU: Vulnerable; EN: Endangered; CR: Critically Endangered.

Vodozemci, gmazovi, ribe (Hrvatska)



Vodozemci (Nepal)

N = 88

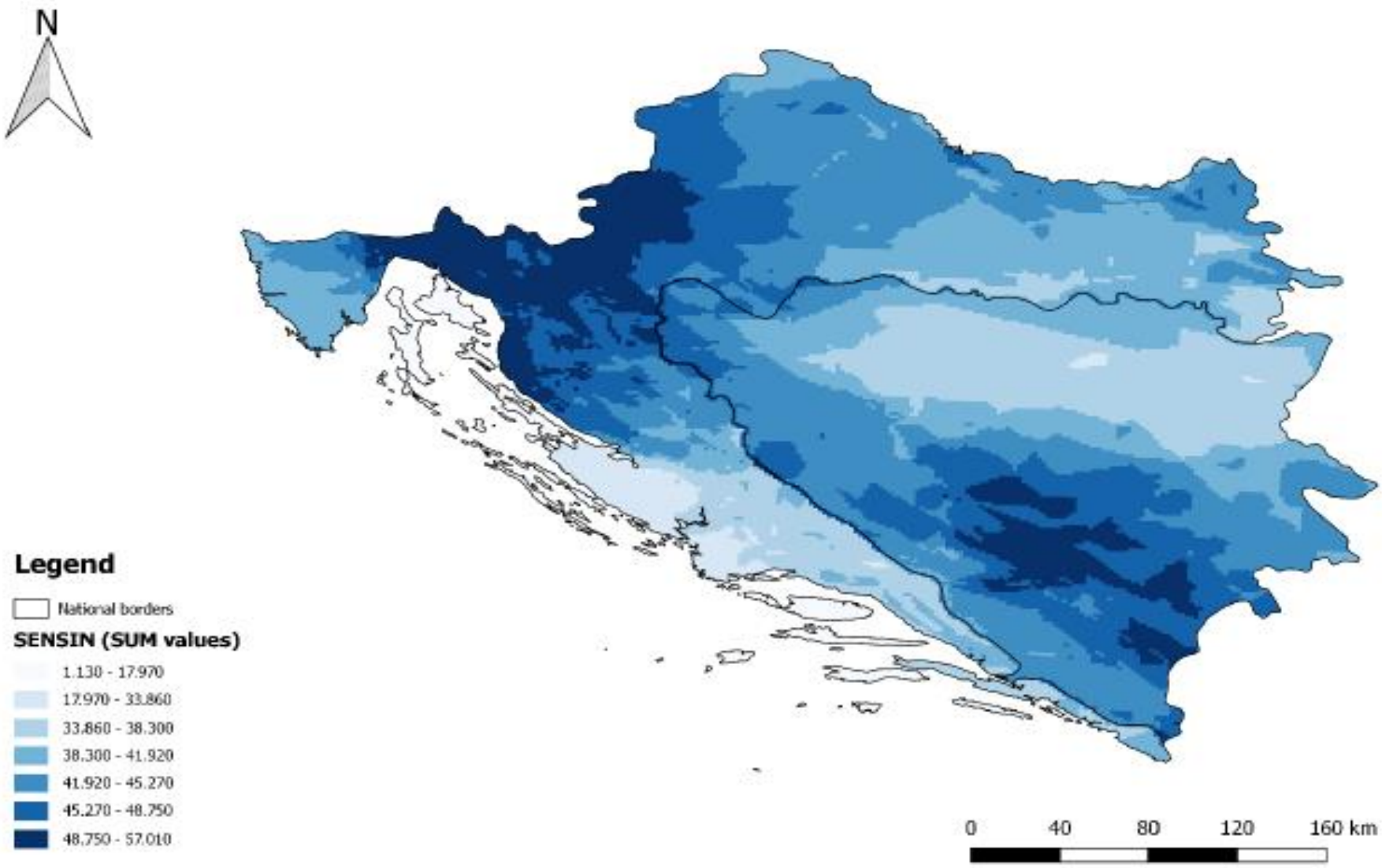


Species name	SENSIN without IUCN	IUCN status [a]
Arvicola scherman	1,07	NE ↑
Barbastella barbastellus	0,80	VU ↓
Canis aureus	1,13	LC ↑
Canis lupus	1,20	LC ↑
Capreolus capreolus	1,13	LC ↑
Castor fiber	1,67	LC ↑
Cervus elaphus	1,53	LC ↑
Chionomys nivalis	1,13	LC ↑
Cricetus cricetus	1,07	LC ↑
Dama dama	1,60	LC ↑
Dinaromys bogdanovi	1,27	NT ↑
Dryomys nitedula	1,07	LC ↑
Eptesicus nilssonii	1,40	LC ↑
Felis silvestris	1,20	LC ↑
Lynx lynx	1,47	LC ↑
Martes martes	1,13	LC ↑
Microtus thomasi	1,13	NE ↑
Mus spicilegus	1,20	LC ↑
Myotis dasycneme	1,20	NT ↑
Nannospalax leucodon	1,40	LC ↑
Nyctalus lasiopterus	1,27	DD ↑
Oryctolagus cuniculus	1,20	NT ↑
Plecotus kolombatovici	1,33	NT ↑
Plecotus macrobullaris	1,27	NT ↑
Rhinolophus euryale	0,93	VU ↓

SENSIN

Sensitivity Index as a tool for the assessment of biodiversity

- Assessing terrestrial mammal biodiversity in Croatia and Bosnia and Herzegovina



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From a formal endorsement of its findings by the CBD COP13, to articles in leading science journals, national action plans and a new coalition of supportive Governments, the IPBES Pollination Assessment is gaining real policy traction. IPBES would like to acknowledge and thank all of the experts who contributed to the assessment, and whose efforts have already made so great an impact in

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HVALA!
Proteus
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MAVA
صندوق محمد بن زايد
للمحافظة على الكائنات الحية
The Mohamed bin Zayed
ZSL
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